PROCEEDINGS

REGIONAL RANGE WORKSHOP

RANGE MANAGEMENT FOR LIVESTOCK PRODUCTION

OKANAGAN-KOOTENAY REGION
B.C. MINISTRY OF AGRICULTURE AND FOOD

87-00547/

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LOCATIONS & DATES OF WORKSHOPS

February 3, 1984	Vernon
February 18, 1985	Princeton
February 19, 1985	Oliver
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This program was given priority for delivery throughout the Okanagan/Kootenay region by the Range Sector of Regional Field Crop and Range Committee; this Committee includes representatives of livestock producers, BC Ministry of Forests and BC Ministry of Agriculture and Food.

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MANAGING CATTLE ON RANGE IN RELATION TO THEIR INHERENT BEHAVIORAL PATTERNS AND HERD EFFICIENCY

C.W. Campbell

Prior to 1920 in North America improvement of native range was studied and undertaken with what was considered to be the following benefits:

1. -substituting an organized, productive and economical system of cropping the natural forage crop for a less satisfactory one.
2. -fencing of certain portions of native range was considered important to success with stock control and range improvement programs.
3. -the utilization of natural pasture or range was expected to be definitely more controlled - with the destructive practice of grazing the forage early in the spring, when the soil was concentrated with moisture and the grass was just starting to grow being avoided. Fencing was expected to help conserve forage for specific seasonal periods.
4. -to control livestock and help range managers and ranchers maintain the native forage base in an acceptable state of productivity.
5. -to improve water facilities thus reducing excessive travel of livestock. Springs were developed and protected, rather than trampled, through use of water troughs. Windmills, wells, reservoirs and dams were constructed to collect and/or provide water.

Controlled grazing plans rather than the open-range often mistreated system of grazing led to:

1. - an improvement in breed and quality of livestock produced,

or straying was reduced, genetically inferior males were culled with the advantage of selecting and breeding the more desirable animals. The ranchers developed better ratios between number of males and females increasing the annual percent calf crop.

2. -improved methods in stock handling with compensating cost reduction. Fencing was used to control stock and reduce their travel.

3. -supplemental feeding and improved water facilities where practical, thus increasing the number of livestock managed. Water development and fences facilitated the freeing of stock from excessive travel, allowing for better gains, reduced forage damage and increased livestock numbers.

Ranchers of yesteryear ran vast numbers of cattle at large on open ranges as this was the economical method of beef production of the time. However, as years passed, and concern for public grazing lands emerged, ranchers were forced to change management methods as a result of rural population pressures, resource use pressures and consumer demands. Improved harvesting and forage preservation techniques among other production advances helped the rancher move into a new era of beef cattle production. Changes in beef production occurred to the benefit of cattle quality, pasture and range management and monetary advantages as outlined in the beginning paragraphs. This also led to the animal and range sciences developing as formal occupations. Thus, today we have, to mention a few, professional people involved in cattle, range, timber, water and the quality of our environment. Also, we have hunters, fishermen, environmentalists and other agencies or interested parties using public lands. Thus decisions involving the grazing of cattle on public lands include many different agencies and organizations. This is definitely an acceptable approach; however, pitfalls exist as we progress in resource administration, unless the goals and objectives are clearly defined and we continue to relate to basics. To develop, maintain and utilize optimally the forage resources within the confines

of crown lands in British Columbia is a matter of great economic importance to the province accomplished with the desired protection of timber, wildlife, watersheds, other agency and public interests and the beef cattle industry.

Operating independent from other segments of society does not exist today. The growth in population has proportionately increased the demand for open spaces as well as a voice in how this space might affect their lives.

The human body is composed largely of nitrogenous material contained within cellular structure, thus food containing an ample supply of nitrogen is an essential part of the diet. Meat is rich in nitrogenous material, and in a form more readily digestible than the nitrogenous material found in cereals and certain vegetables where it is tied up to a great extent in cellulose, an indigestible material. Therefore meat is an integral part of the diet of all advanced countries.

The Canadian consumer, like the U.S. consumer, can purchase more meat of a high quality for an hour of labour than a consumer in most any other part of the world; from fewer ranches producing cattle.

The natural vegetation on our rangelands can be converted to more useful products, such as red meat, very efficiently by domestic livestock.

Thus the British Columbia ranching industry is very important in supplying to the consumer high-quality red meat; but it depends upon the continued availability and appropriate use of crown range in most areas.

Today, as in the past a good knowledge of "cow-savy" and "range-savy" is essential to a successful ranching operation.

With range-cattle management, problems may unintentionally arise which could seriously affect the production potential and jeopardize the viability of a ranch, often from a general lack of knowledge by everyone concerned with changes in range-grazing habits and subsequent cow herd productivity.

The following points need to be kept in mind when considering cow-herd production efficiency:

1. Average weaning weight = $\frac{\text{Total pounds of calves weaned.}}{\text{Total cows exposed to bulls.}}$ = Herd efficiency.

2. Percentage of calf crop = $\frac{\text{Number of calves weaned.}}{\text{Total cows exposed to bulls.}}$

3. Reproductive Efficiency influenced by:
    1. Percentage of cows having calves
    2. Calf birth dates
    3. Calf survival to weaning.

4. Reproductive Performance depends upon:
    1. Number of early calving cows; giving them time to clean and breed early.
    2. A high percentage of cows cycling normally.
    3. A high percentage of cows conceiving to first service.
    4. High percentage of cows maintaining pregnancy to term.
    5. Calf survival to weaning.

Ranchers should plan specific cattle management practices to coincide with seasonal changes in forage quality; thus maximizing cattle production from the range resource. This should be accompanied by sound range management practices.

Cattle response is related to changes in forage quality; as forage quality increases, animal response increases and vise-versa. Optimum use should be made of seasonal periods when range forage is of highest quality.

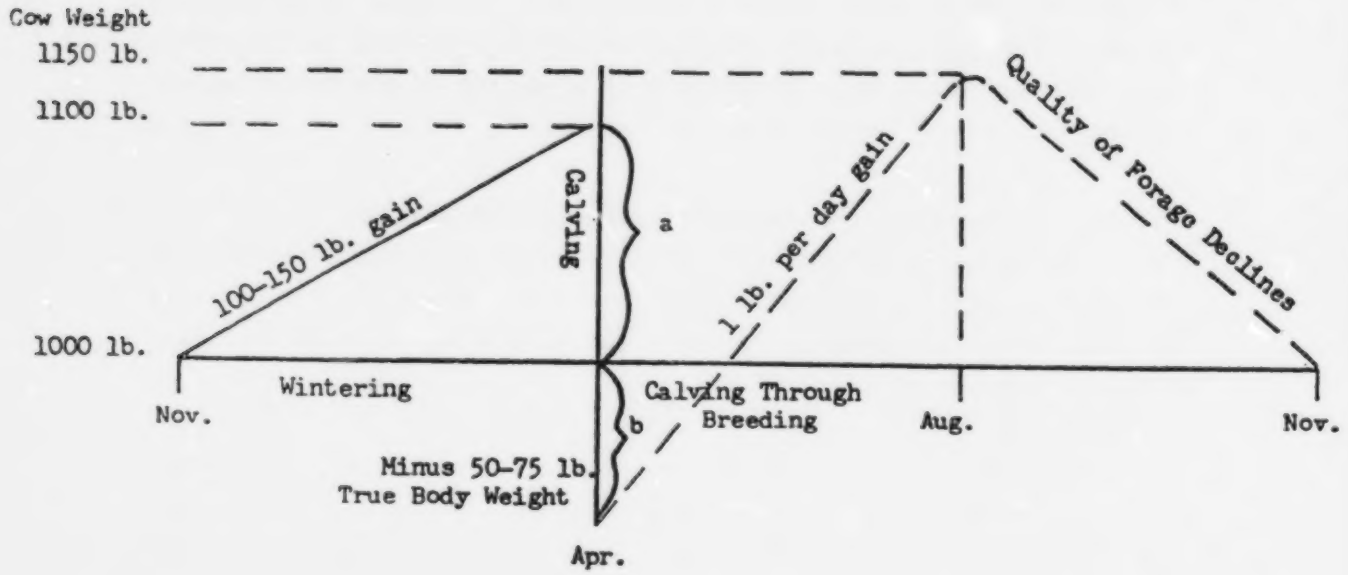
Certain supplements, length of breeding season, calving interval, time of weaning and grazing management practices should all be considered in any range grazing system to maximize production from the cow herd. Cattlemen must have their breeding herd producing to maximum potential to make best use of the range forage resource.

Female cattle turned out on range must be healthy and in condition to gain weight. Calves should be growthy and in good physical condition for them to make maximum use of the nutritious forage available during spring and early summer. Ranchers should aim for high percent calf crop and heavy weaning weights in the fall.

Cow herds should calve as early as possible considering, of course, climate, facilities, labour and other regional factors. This allows for both cows and calves to be in proper condition when turn out day arrives, thus better utilization of the nutritious forage.

The winter nutrition of cows and heifers will be reflected in their performance on the range, both in terms of breeding and calf weaning weights. Ranchers should have their cows breeding early and calving early; this means cows should be gaining weight following calving and through the breeding season to improve fertility and conception rates.

COW CONDITION CYCLE



a. Weight loss from calf, membranes, fluid etc.

b. True body weight loss up to approximately 5 - 7 percent.
Total weight loss should not exceed 15 percent.

Breeding Cattle on Range

As mentioned, have cows in good shape going into the breeding season. Reproductive performance is enhanced if cows and heifers have been grazing nutritious green pasture or early spring range prior to breeding. Cows should be physiologically normal, free from disease and over the stress of calving and early lactation.

If possible, cows should be bred on the more open grassland range. This allows easier travelling for the bulls and easier observation by range riders. Range management practices may not allow for much grazing on open grasslands in order to save the more fragile areas for early spring

or late fall use, and for wintering wildlife. Thus if the breeding herd is on early spring range, bulls should be turned out with cows (where practical for appropriate calving season) as soon as possible giving them a chance to breed cows, hopefully through one heat cycle prior to the herd moving to the higher more densely forested range. The establishment of breeding pastures is highly desireable to promote concentrated breeding and early conception followed by an early short calving season the following spring.

The proper selection of stock for different classes of range is important. Suitability of range to different classes of stock depends upon:

- character of forage
- topography
- water
- pests etc.

* Handling of stock on timber reproduction sites (regulated grazing).

A more concentrated breeding season may require more bulls than traditionally used. The bull : cow ratio may have to be 1 : 20 or greater depending upon length of breeding season, terrain etc. in order that cows are bred early. Cows should be bred during their first heat cycle in the breeding season. If a cow does not conceive the first time she shows heat, she calves 21 days later and the calf is 21 days younger at weaning. with an average rate of gain of 1.5 pounds gain per day from birth to weaning this represents 30 pounds less calf than if the cow had bred early. Cows that breed late tend to breed late every year, and this results in late calving cows. Once a cow calves late it is very difficult to move her calving date back without skipping a year. Cows that breed late should be culled as they are an expense to the breeding herd.

Reproduction - Sexual behaviour in cattle is largely controlled by genetic factors; however, the environment either inhibits or enhances the expression of the genetic material.

Genotype (genetic ability)	+	environment (climate, disease, nutrition, stress)	=	Phenotype (Performance reproduction, weight gain, lactation)

Breeding becomes intensified with precipitation and the associated rapid growth in forage. Duuring adaptation to new surroundings, cycling and conception in cows may be reduced. It is inadviseable to rotate cows from pasture to pasture during the season and particularly during the breeding season (different or new feed and new surroundings may cause reproduction and weight gain problems to arise). Therefore when a new range grazing pattern is implemented, and for the first couple of years when the range is a new area for the cows and they are not settled down, extra riding and additional bulls may be required. Breeding heifers prior to cow herd is advantageous, as they will calve prior to the mature cows, clean, then cycle and breed with the cows during the breeding season. (Heifers take longer to clean and cycle following calving than do mature cows).

Introducing bulls to new surroundings may reduce libido. There may at times be a stimulus value of changed mating sites, but usually only in animals showing reduced libido.

Conditioning - presence of cows is an unconditional stimuli for bulls. However, a breeding pasture used for a few years may lead to conditioned stimuli for bulls when no females present. Cows repond similarly. This is important when changing an animal's environment. Newly purchased or yearling bulls could go on a new range to circumvent conditioned response. Riding is necessary to herd bulls to cows to ensure adequate

breeding and a calf crop the next spring. A bull : cow ratio of 1 : 20 or better may be required on some ranges. Climate and topography are also important factors with respect to bulls and mating.

* Short breeding period = short calving period = older and more even lots of calves for market = preferable prices.

Use of Range

Cattle graze

- open areas preferably - note: insects, wind, shade etc.
- lower portions of the range providing forage is available.
- respond to daily animal comforts of temperature, wind, humidity, exposure, footing, etc.
- graze forage preferences.
- may repeatedly graze where previous grazing has stimulated green growth.
- tend to graze the smoother terrain areas (topography).
- domestic animals may interact with certain wild ungulates - wild species distribute well whereas domestic stock prefer selected areas.
- yearlings make better use of remote areas than cows with calves at foot.
- dry cows travel better than wet cows - early weaning?
- tend to congregate around waterholes and salting grounds.
- graze early morning and evening.

Controlling Cattle on Range

Anthropomorphism - cowman attempts to interpret an animals' motivation. Practical animal workers acquire an "intuitive" view of animal habits - they become very skilled in predicting the behaviour of animals. The "emotional" state of the animal must be taken into account when evaluating its behaviour. This is important when managing cattle on range and implementing range management plans.

* Extra attention must be paid to routine management of cows when they are being established in a new grazing area. Cattle drift to established grazing areas and are difficult to hold on new ranges that are unfamiliar. Extra riding may well be necessary to keep cows from walking fence lines. Cows must be dispersed with the bulls. Changing the established routine of cows on range often increases the incidence of low conception rate and possible early embryonic failure, with subsequent detection of open cows in the fall. This may be due to different climate, strange pastures or forage, change in social status, disease, stress or any combination of these. Therefore extra management will be necessary when the routine is altered in order to maintain an acceptable calf-crop percentage.

* Points to consider:

1. salting
2. water
3. riding-mangement
4. use of leader cows - very important
5. disease, flies etc.
6. fences
7. stock trails
8. predators
9. climate, temperature, etc.

* No stock range can be efficiently utilized if there is an uneven or inadequate distribution of water. The abundance and distribution of water supply determines, as a very important factor, the time in the season when the forage may be cropped, and thus regulates the value of the range and determines the methods of managing the range as well as the stock.

Range Forage

*Forage quality declines in late summer and into fall when energy, protein and phosphorus levels decrease.

Note: - cows eat every day
- grass only grows during part of the grazing season
- forage varies in quality at different times of the season. Cattle Management on range must relate to seasonal forage quality changes.
- cows and grass may not be compatible (forage quality vs. animal performance)
- cow requirements are high when range forage is fragile.
- Spring - nutrient level high in forage and animal can consume enough quality dry matter to meet requirements.
- Late Summer and Fall - cow may need to consume more forage to obtain some nutrient level. Intake of forage may drop due to reduced palatability. Cows may not be able to eat enough to receive adequate nutrients, thus they may start to lose weight. Increasing another nutrient may not help.
- Late Summer - cow is pregnant with new calf plus lactating for calf at foot.
- as forage quality declines weight gains in calves decrease and when calves are in an important phase of their growth curve.
- Range Plans must be designed to provide nutritious forage at appropriate times.

*Therefore any feasible plan for improving range must accommodate a grazing system which permits use of the range during the growing season and it would be desireable to manipulate use of range areas to prolong higher levels of forage quality and stimulate high quality re-growth.

Feed Value of Forage

- yield
- palatability
- nutritional value - for milk production, growth, (performance) maintenance (spring-fall).
- accessibility
- forage preferences
- supplements on range, nutritional, and possibly a means of helping overcome range pattern changes for cattle ie. the late summer use of pinegrass may be improved with supplementation.
- early weaning related to forage value.
  - desireable
  - practical
  - preconditioning calves for market

Cattle require 10+ times the energy to graze compared to confinement, thus maintenance requirements are increased. Grazing time is increased as forage supplies drop.

Cattle have a good sense of smell and in the spring may select preferred forages rather than forages providing the highest yield. Animals introduced into a new pasture must often accustom themselves to new forage species. Small pastures may be helpful in this situation saving energy and trampling of forage. Younger stock are less selective but require more forage due to varied diet.

When range grass is abundant, the animals genetic potential limits its productivity. However, reduced forage availability limits animal production thus cattle may or may not respond to a range improvement program.

Fencing

*Cattle Control helps curtail overuse of certain areas - prevents excessive wandering, thus can help reduce labour costs of gathering cattle - animals are confined to smaller areas, thus they can be watched easier - advantage in gathering more cattle in a shorter period of time to meet certain conditions such as sales etc. Riding may return a higher percentage of animals off range on first gather. Possibility of breeding pastures (45 days?) for control of breeding, then cows can be moved onto larger areas etc.

Problems to consider:

- Fence maintenance
- More help during the breeding season.
- Bulls or cows may get out
- Cows not bred when in heat
- Are fences and trails in the right locations as they are costly to change if not correct Perimeter fencing is much more important than cross fencing at first as it is easy to crossfence in wrong location.

*Increased riding and proper salting may reduce the need for some fences. Some fences do not need to be completely enclosed and possibly more use made of natural barriers. Response can be good if fences, gates and other facilities are designed with topography, water and natural travel routes by livestock kept in mind. Livestock should be allowed to move into new pastures by themselves with gates being opened at the designated time. However, the time alloted for movement of cattle from one pasture to another may predispose rounding up cattle from a pasture in one day.

New fencing may predispose the requirement for additional riding and more bulls during the breeding season for a couple of years. Older cows raised on the range become very traditional in their grazing habits. This may not be good for proper range utilization. Changing of traditional grazing habits is the purpose of fencing; however, this may be upsetting to the cow. The habits of cattle must be considered respecting fencing and other aspects of range planning.

SUMMARY

Cattle Management on range should be related to forage quality. As forage quality declines later in the grazing season, cow and calf gains may decline, and specific management practices should be undertaken to offset this. A high percent calf crop accompanied by good weaning weights with proper range management should be desired by every cattle producer. Fencing, water development, planned grazing systems, improved nutrition, improved livestock breeding programs, good herd health and general attention to range improvements are good investments.

Any grazing system must consider the production goals of the rancher in terms of:

- Breeding season
- Calving interval
- Time of Weaning
- Class of livestock and marketing

All planning must consider a cow habit point of view.

The producer must strive for:

- short breeding season
- short calving season
- adequate heifer weight for breeding as yearlings
- high fertility in reproducing females
- fertile bulls (adequate bull:cow ratio)
- good birth to weaning weights in calves.

*Thus the producer must be aware and prevent environmental changes from reducing the performance of his herd. He will need all the co-operation possible from the natural - resource agencies in order to maximize production and yet satisfy native range-land concerns.

Ranchers cannot afford to have many dry cows or raise late calves that wean off light.

REFERENCES - SELECTED

Barnes, W.C. 1913. "Western Grazing Grounds and Forest Ranges." Chicago: The Breeder's Gazette.

Heady, H.F. 1975. Rangeland Management. McGraw - Hill, New York

McLean, A. ed. 1979. Range Management - Handbook for British Columbia. Wayside Press Ltd., Vernon, B.C.

McLean, A. and Pendray, W.C. 1968. Range Management Pays. C.D.A. Publication 1382.

Sampson, A.W. 1923. Range and Pasture Management. John Wiley & Sons, Inc., New York.

Vavra, M. and R.J. Raleigh. 1976. "Coordinating Beef Cattle Management with the Range Forage Resource." J. Range Management 29:449

LOGICAL DECISIONS IN IMPROVING PRODUCTION AND UTILIZATION OF RANGE FORAGE

FACTORS AFFECTING BEEF PRODUCTION

1. Numbers of animals
2. Genetic capability
3. Nutrition
4. Stress
5. Grazing System

FACTORS AFFECTING RANGE PRODUCTION

1. Non-forage species i.e. trees and weed species
2. Soil fertility
3. Soil moisture
4. Grazing System

RANGE MANAGEMENT

Endeavors to produce optimum amounts of products in combinations demanded by man.

Range management developed in the western U.S. about 1900 after widespread overgrazing had taken place. Rangelands had greatly deteriorated. Range management guidelines were developed to restore the range. Unfortunately the guidelines and rules of thumb developed in the early part of the century for overgrazed range in the western states have been adopted to some extent in B.C. In some instances guidelines, intended for range restoration, are applied to rangelands that have never been overgrazed.

There is no longer a need to manage rangelands by general "rules of thumb". We now have the knowledge to manage range based on the biological and physical conditions found on each ranch and the differing objectives of ranch managers.

Range management is sometimes believed to be the maximizing of forage production. Forage production is only a part of range management. Range management includes the use of range by both animals and man.

The challenge in range management is to produce one or more products from the rangeland. The product may be recreation, beef, elk, trees, white footed mice, pinegrass, wildflowers, or any number of individual products or combination of products. Today we are assuming the objectives of range management is to produce cattle - primarily cows and calves - in a manner which will not reduce the annual forage production over the long term.

NON-FORAGE SPECIES

Weeds such as knapweed, houndstongue, and goatweed are the first plants that come to mind when we think of non-forage species which compete with palatable and useful grasses and legumes. We need to take a broader look at non-forage species. From the ranchers point of view they include anything the cow chooses not to eat when she is out on the range. Trees, shrubs and even some grasses and legumes may be classed as weeds if they become too dense or if they are unpalatable. e.g. sweet clover can be a good forage in early stages of growth but a useless weed if allowed to become over-mature. Even seeded forages such as crested wheatgrass will become unpalatable and undesirable if not grazed before mid-

summer. Bitterbrush is considered a useful forage for cattle in some areas during certain seasons. In most areas we consider it a weed because it is less palatable or nutritious than the lower growing grasses. Where bitterbrush or other shrubs are dense they limit use of good forage growing under them.

Much can be done to improve the quality, quantity, palatability, and availability of forage through grazing at the proper season and control (not necessarily elimination) of competing vegetation. e.g. tree spacing, knapweed spraying and controlled burning of dense shrub stands.

SOIL FERTILITY

Low soil fertility limits forage production and quality on all our rangelands. Production can be increased up to four times by the addition of Nitrogen only. Nitrogen, sulphur, phosphorus, and possibly other nutrients may be needed. Nitrogen alone may double the protein content of grass on dry sites. Fertilizer should be spread on rangelands in late fall to increase yield, provide earlier growth and higher protein content the following spring. The local District Agriculturist should be consulted before applying fertilizer to ensure the right formulation and amount is applied. Seeded grasses respond the best to fertilizer. Only good stands of seeded grass or good condition native range should be fertilized. Do not waste money fertilizing weeds! Fertilizer has particular value for use on special use pastures such as spring pastures, breeding pastures or weaned calf pastures.

GRAZING SYSTEM

A method of managing (using) range to maximize animal production while maintaining future forage production.

Any grazing system must include consideration of:

1. amount of forage available - capacity
2. seasonal variation in nutritive value
3. intensity of grazing the forage can withstand
4. stress placed on the cows

Here in the southern interior we have a very great advantage to other range areas in the seasonal variation in forage growth. At the lowest elevations growth and nutritive value of forage may be at its highest in April or May whereas in alpine areas it will peak in July or August. Therefore our grazing systems are based on elevational differences and cattle are moved upslope from early spring until mid-summer wherever possible.

The lowest and earliest pasture on your range should be grazed first in the spring. Special pastures, - particularly a crested wheatgrass seeding, are extremely valuable for early spring grazing, (such pastures may be supplemented with hay to extend the grazing season or permit increased cattle numbers). When the forage starts to grow rapidly on the next pasture move to it! I don't mean that you should gallop out with your horse and dogs to round up all the cattle and run them up the hill. Pick up all the salt and move it to the next pasture. Open the gates if you have any. Cattle will usually drift uphill in spring by themselves. A few days after moving the salt you can go out and move all the stragglers to the new pasture.

Move the cattle, or allow them to move upslope on their own, as soon as the grass starts to grow rapidly in the next pasture. Keep picking up the salt and move it before you try to move the cattle. You may leave quite a bit of forage in some pastures but your cattle will be taking advantage of the higher elevation grass during its most nutritious stage. Pinegrass or forest range usually does not start to grow rapidly until mid May or early June. Alpine range grows rapidly when the snow melts in late June or early July. Cattle should be on the highest elevation range or north slopes by mid-July most years.

The end of July is a time to reassess your range and plan your fall management. Your cows are now on the highest range or north slopes where the latest growth occurs. The cows are fat and the calves have made good gains. From now until sale time it will become increasingly difficult to keep those calves gaining. What do they weigh now and what will they weigh at sale time? What are your forage resources on the range and on the hay fields? Is that first crop safely stored? When will you harvest the second crop? How many cull cows do you want to sell and how many heifer calves will you keep? Can you wean some, or all, of those calves in August and put them on good pasture at home? What regrowth has there been on pastures grazed earlier in the year? How long will the range hold them at this high elevation? Will the cows move back toward the ranch by themselves or will you move them? Where will they move to next?

I can't answer these questions as every rancher faces different circumstances and they will vary from one year to the next. However midsummer is a good time to reassess your grazing system for the balance of the grazing season.

All of the pastures you have grazed previously should have made some regrowth by mid-summer. The amount of regrowth will depend on heat and rainfall. A second grazing of a forest pasture in early fall may be a good practice - particularly on pinegrass or seeded clearcuts. Native bunchgrasses at the lower elevations may not be able to withstand regrazing in the fall unless they have made good regrowth after spring grazing. Seeded C.W.G. pastures, however, can usually be grazed again in the fall if cattle were removed by mid-May.

The distribution of cattle is a major problem in the use of range. Even use is impossible as there are always areas cattle prefer. Efforts to obtain even use may place excessive stress on the cattle. Good distribution of cattle can be encouraged by heavy stocking rates, salting only on the less preferred areas, abundant watering sites (every 1/2 mile). If heavy stocking rates are used care must be taken that cattle are not stressed by a lack of forage and secondly that the grazing period is not more than one month during the growing period. Longer grazing periods increase the possibility of plant damage.

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AHB*pl
September 1985

NUTRITIONAL REQUIREMENTS

and

SHORTFALLS

of

GRAZING BEEF CATTLE

Mike Malmberg
B.C. Ministry of Agriculture & Food
Cranbrook, B.C.
February 1985

BEEF CATTLE NUTRITION - SUMMER NEEDS AND SHORTFALLS

Introduction

Rancher's concerns about cattle nutrition are focussed on the wintering period. The process of securing a winter feed supply, taking feed samples, formulating rations and buying feed, puts the focus of nutrition on the wintering period.

Little thought is given to cattle nutrition from the time cows hit green grass in the spring until the winter feeding starts. Yet it is during the grazing season that the saleable product (pounds of live weight gain) is produced.

Nutritional shortfalls can, and often do, occur during the grazing season. These shortfalls drastically reduce production and cut deeply into profit potential of the ranching operation. Through understanding how these nutritional shortfalls occur and how they affect profitability, ranchers may be able to adjust their management systems to increase profits.

The first step is to understand the nutritional requirements of the grazing animals. Secondly, be aware of the nutrient content of the forage during the grazing season. Comparing the nutrient requirements to availability will identify when shortages occur. Next, it is important to look at the effect of the nutritional shortfalls on production and the cost of reduced weight gains. Finally, consider how the shortfalls can be minimized or avoided to achieve higher production and profitability.

Nutritional Requirements

Tables 1, 2 and 3 show the energy, protein and phosphorus requirements of various classes of livestock.

Table 1 - Energy - Points to Note.

1. Cow energy requirements jump from 9 to 12 lbs TDN per head per day (9 to 14 for heavy milkers) - an increase of 33 to 55%! This increase corresponds to calving and the increased demands of lactation.

2. Cow energy requirements drop dramatically as lactation drops off in July (after about 120 days lactation).

3. Yearling steer energy requirements increase gradually as body weight increases.

4. Calf energy requirements from the forage increases rapidly as cow lactation drops.

Table 1 - Energy Requirements

- 1000 lb. Mature Beef Cow
- Yearling Steers (550 - 750 lbs.)
  (1.5 lbs/day)
- Nursing Calves (in addition to energy from cow)

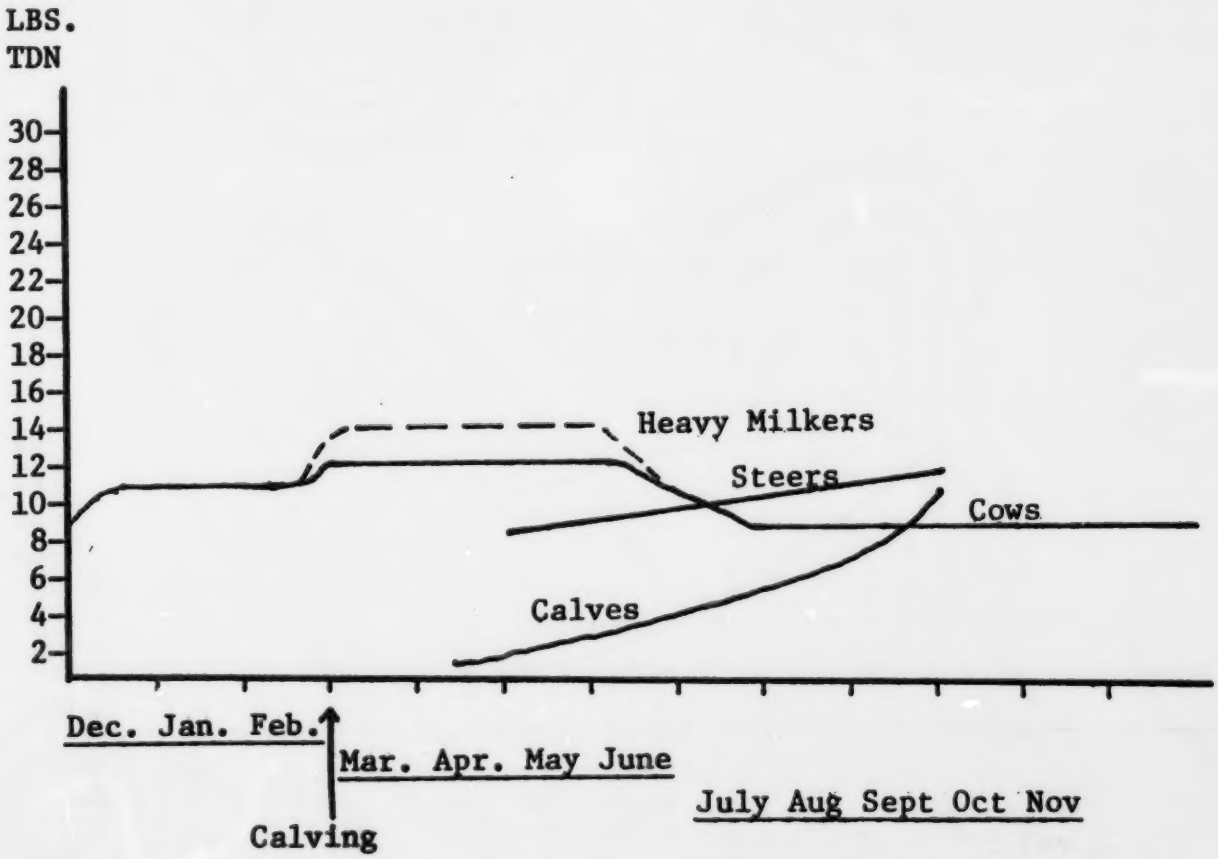


Table 2 - Protein - Points to Note.

1. Cow protein requirements jump from 6 to 16 oz. per day (6 to 24 for heavy milkers) - an increase of 166 to 300%! This increase corresponds to calving and the increased demands of lactation. Note how much greater protein demands increase than energy demands. Note also the greater spread between normal and heavy milkers for protein compared to energy (33 to 55% for energy vs 166 to 300% for protein, that is, heavy milkers need 66% more energy but 80% more protein than normal milkers). This has implications for producers using the exotic breeds and crossbreds.

2. Protein requirements drop dramatically as lactation drops in July (after about 120 days lactation).

Table 2 - Protein Requirements

(digestible)

- 1000 lb. Mature Beef Cow
- Yearling Steers (550 - 750 lbs.)
  (1.5 lbs/day)
- Nursing Calves (in addition to protein from cow)

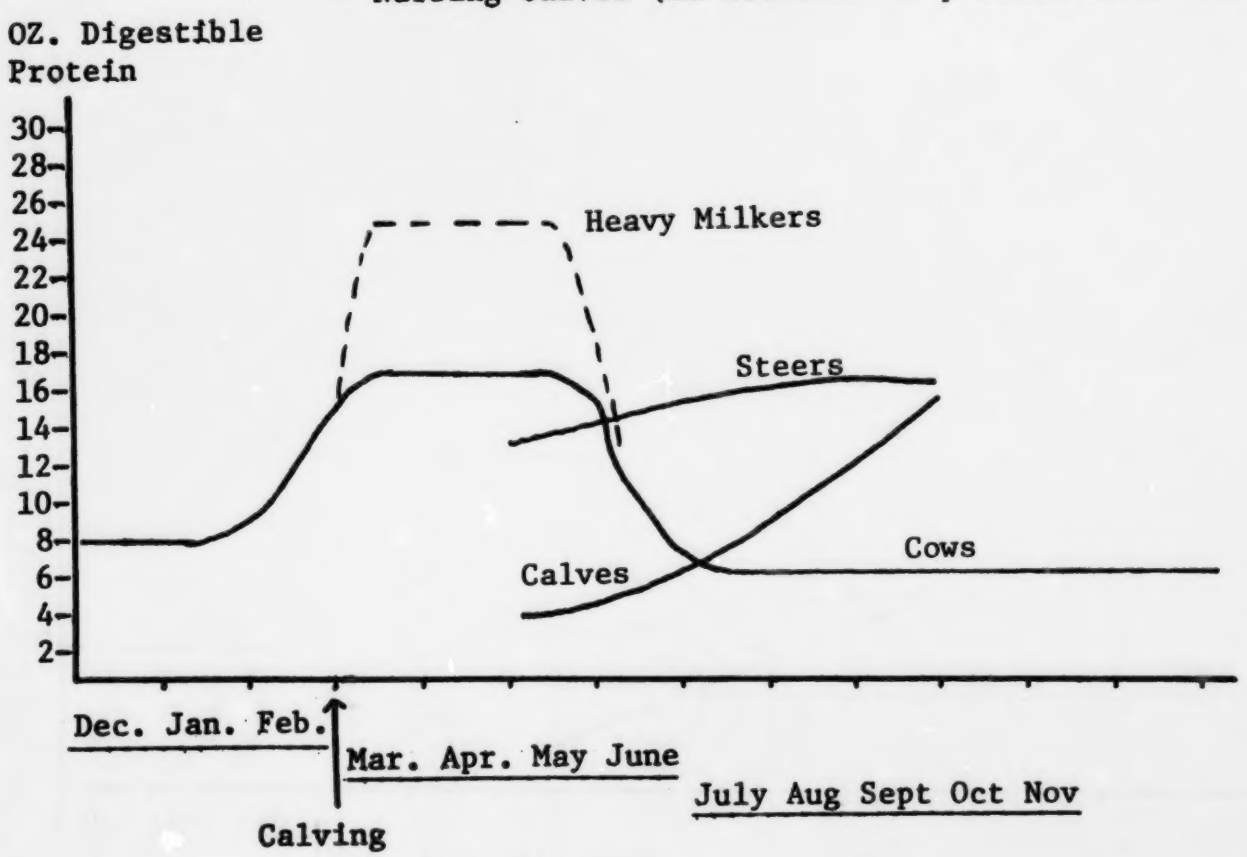


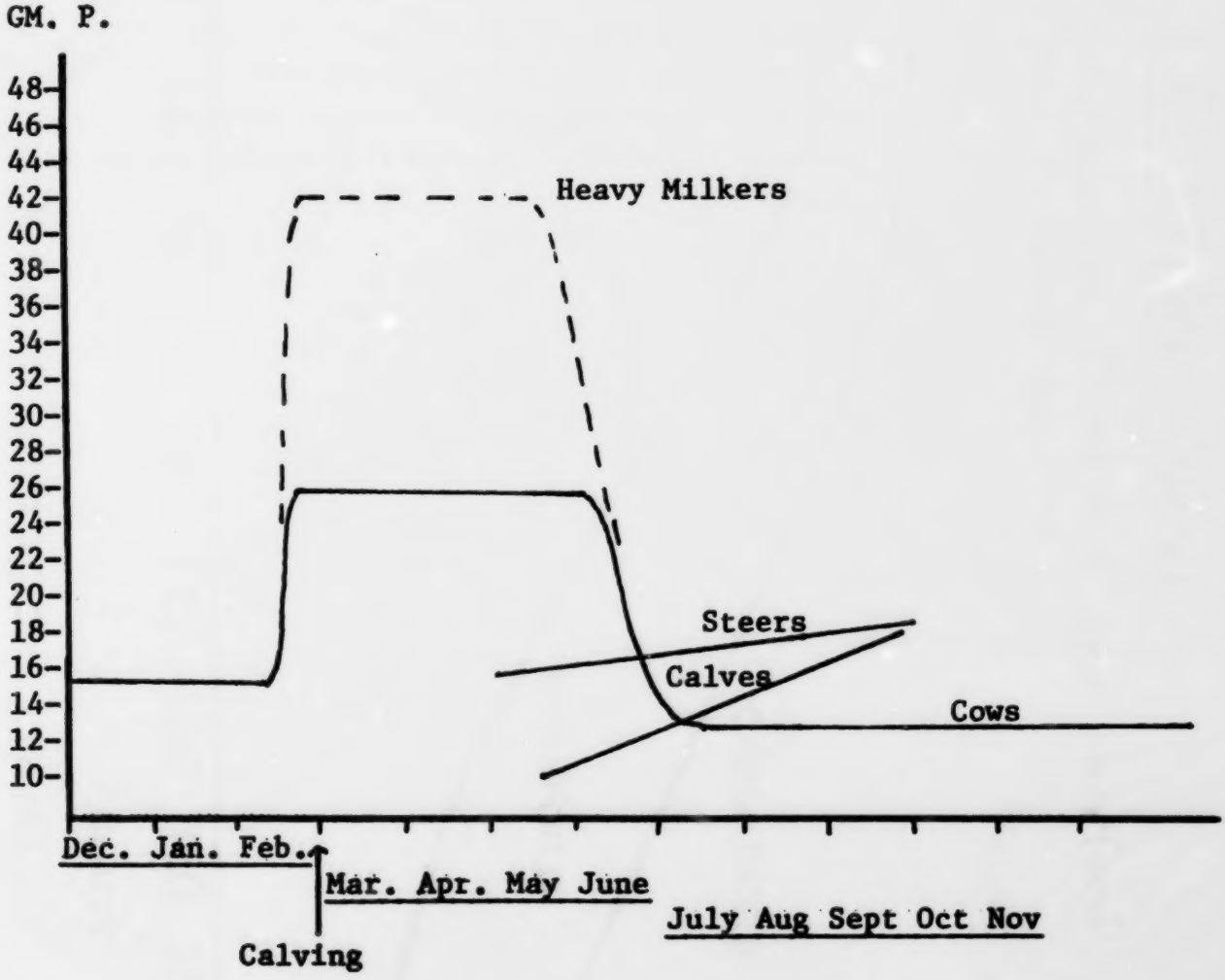
Table 3 - Phosphorus - Points to Note.

1. Cow phosphorus requirements jump from 12 to 26 grams per day (12 to 42 for heavy milkers) - an increase of 116 to 250%! This increase corresponds to calving and the increased demands of lactation. Note that phosphorus demands jump much more dramatically than energy demands and follow a pattern similar to protein. Note also the greater spread between normal and heavy milkers for phosphorus compared to energy. This is similar to the effects heavier lactation has on protein demands.

2. Phosphorus requirements drop dramatically as lactation reduces in July (about 120 days of lactation).

Table 3 - Phosphorus Requirements

- 1000 lb. Mature Beef Cow
- Yearling Steers (550 - 750 lbs.)
  (1.5 lbs/day)
- Nursing Calves (in addition to phosphorus from cow)



Lactation Curves

The lactation curves shown in Table 4 are for mature crossbred and hereford cows receiving an adequate diet.

Table 4 - Lactation Curves - Points to Note.

1. Crossbreds have higher milk production than traditional breeds.

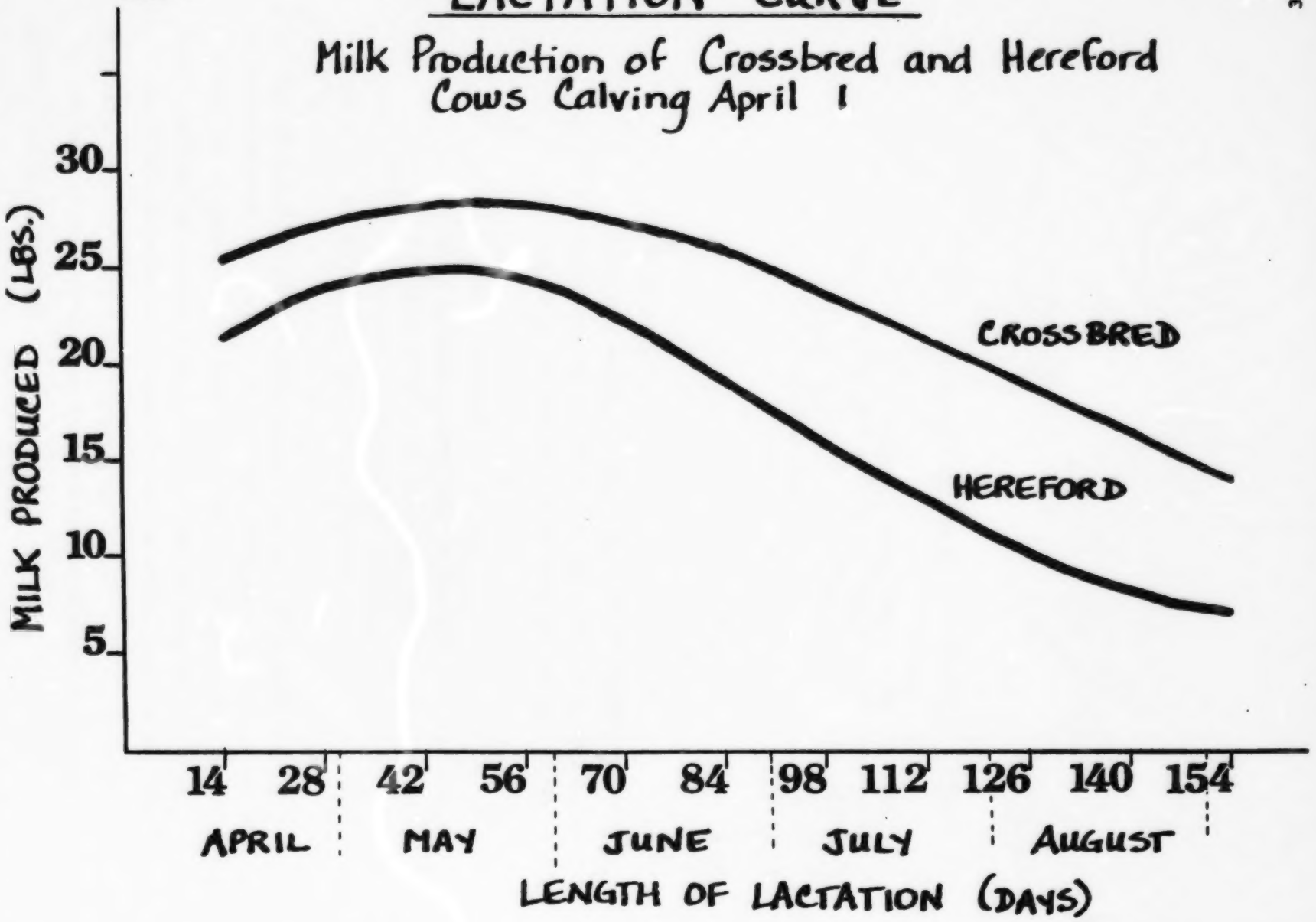
2. Lactation drops after about 120 days lactation. The reduction is less dramatic for crossbreds.

3. Lactation drops even though diet is adequate. It will drop more dramatically if nutrients are lacking; however, once the reduction has occurred, lactation cannot be significantly increased by increasing nutrient levels!

Table 4

LACTATION CURVE

Milk Production of Crossbred and Hereford Cows Calving April 1



Nutrient Content of Forages

Tables 5, 6 and 7 show the energy, protein and phosphorus content of forages with different stages of maturity.

Differences between species for the various maturity stages are not great. However, the stages of maturity can occur at different times of the year for different species, weather conditions, locations and grazing or cutting management. This is an important point because it holds one of the keys to improving nutrient availability for grazing animals.

Table 5 - Energy Content - Points to Note.

1. Energy is measured in TDN, thus changing digestibility is taken into account (this is not the case with protein and phosphorus).

2. TDN can be as high as 70% in early spring (similar to energy content of oat grain) and drops to 45% for mature weathered material - digestible energy is 55% higher in new growth!

Table 5 - Energy Content of Forages (%TDN)

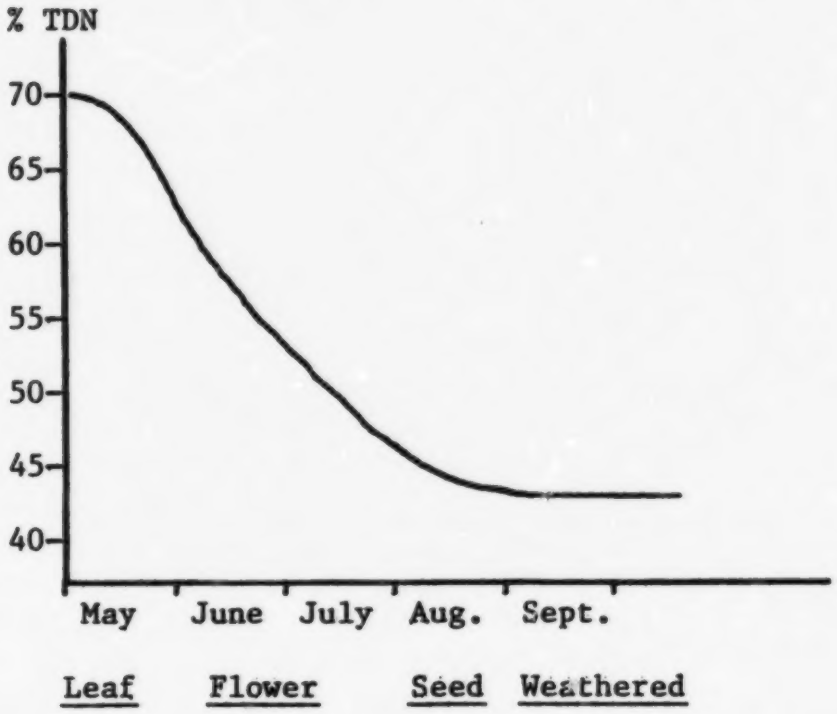


Table 6 - Protein Content of Forages - Points to Note.

1. Protein is measured in crude protein and does not take into account decreasing digestibility. Digestibility may be around 70% in new growth but drops to around 50% for weathered material.

2. Protein may be as high as 18% for new growth but drops to around 4% in mature weathered forage - protein is 350% higher in new growth!

Table 6 - Nutrient Content of Forages

% Protein

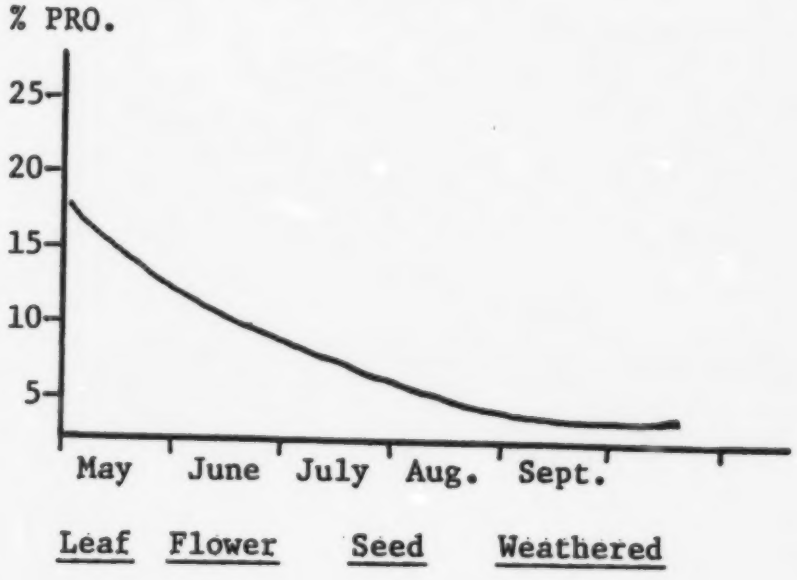


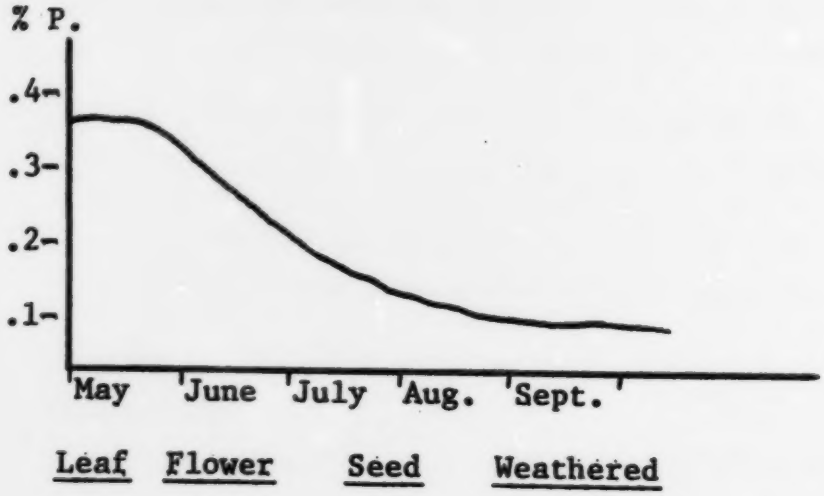
Table 7 - Phosphorus Content of Forages - Points to Note.

1. Phosphorus measurements do not take into account changes in availability of phosphorus to the animals that occurs with maturity due to lignin build-up. Phosphorus may be 70% available in new growth and may drop to below 60% availability in mature forage.

2. Phosphorus drops from .38% in new growth down to .08% in mature forage - phosphorus is 375% higher in new growth!

Table 7 - Nutrient Content of Forages

% Phosphorus



Nutrient Requirements and Availability - Grazing Cow

Tables 8, 9 and 10 show the requirements and availability of energy, protein and phosphorus for a grazing cow.

The tables point out the shortages that can occur if the animals are grazing forage that has new growth in May, flowers in late June to early July, sets seed in late July to mid-August and becomes fully mature and weathered from September onward. The grazing animals will, of course, have a variety of plant species available to them and selectivity does occur. These factors will likely be more significant for protein than energy.

As forage becomes more mature and hence less digestible, the maximum possible intake will drop. This is shown in the reduced dry matter consumption as a percentage of body weight. The problem of reduced intake compounds the reduced nutrient availability of the forage.

The points to note are listed under the tables.

Table 8

CATTLE REQUIREMENTS & AVAILABILITY

1200 LB. COW

ENERGY (TDN)

Month	Forage Consumed Pounds	Energy (TDN) Requirements (Lbs)	Energy (TDN) Available From Forage
MAY	*(2%) 24	16	(70%) 17
JUNE	*(2%) 24	16	(65%) 16
JULY	*(2%) 24	16	(60%) 14.5
AUG.	*(1.75%) 21	13	(50%) 10.5
SEPT.	*(1.5%) 18	13	(50%) 9
OCT.	*(1.5%) 18	10	(45%) 8

* Percentage of body weight = Pounds Consumed.

Points to Note:

1. Consumption drops as digestibility of the forage becomes lower.
2. Energy requirements are adequate until July.
3. The energy shortage is highest in August and September.
4. The energy shortfall is not as acute from October onward due to reduced or no requirements for lactation.
5. This table has significance for people selling cull cows. Weight gain (even maintenance) is not likely to occur even after weaning.

Table 9

CATTLE REQUIREMENTS & AVAILABILITY

1200 LB. COW

CRUDE PROTEIN (Lbs.)

Month	Forage Consumed Pounds	Crude Protein Requirements (Lbs)	Crude Protein (Lbs) Available From Forage
MAY	*(2%) 24	3	(18%) 4.3
JUNE	*(2%) 24	3	(14%) 3.3
JULY	*(2%) 24	3	(10%) 2.4
AUG.	*(1.75)21	2	(9%) 1.9
SEPT.	*(1.5%)18	2	(7%) 1.3
OCT.	*(1.5%)18	1.5	(7%) 1.3

* Percentage of body weight = Pounds Consumed.

Points to Note:

1. Protein levels are adequate until July.
2. Lactation requirements represent the greatest demand for protein and this shortfall is relieved at weaning.
3. The requirements listed are for heavy lactating animals - protein requirements would be met for low milk producers!

Table 10

CATTLE REQUIREMENTS & AVAILABILITY

1200 LB. COW

PHOSPHORUS (Lbs)

Month	Forage Consumed Pounds		Phosphorus Requirements (Lbs)	Phosphorus (Lbs) Available From Forage	
MAY	*(2%)	24	0.10	(.4%)	.09
JUNE	*(2%)	24	0.10	(.3%)	.07
JULY	*(2%)	24	0.10	(.15%)	.04
AUG.	*(1.75%)	21	0.07	(.10%)	.02
SEPT.	*(1.5%)	18	0.07	(.10%)	.02
OCT.	*(1.5%)	18	0.04	(.08%)	.015

* Percentage of body weight = Pounds Consumed

Points to Note:

1. Major phosphorus shortages occur by July.
2. Lactating cows may be receiving less than 1/3 of their phosphorus needs from the first of July onward without phosphorus supplementation.
3. Phosphorus is critical for efficient reproduction and is required for a good appetite!

Nutrient Requirements and Availability - Nursing Calf

Tables 11, 12 and 13 show the requirements and availability of energy, protein and phosphorus for a nursing calf expected to gain 2.25 lbs. per day.

The tables point out the shortages that can occur as lactation decreases and the calf relies more and more on forage for its nutrient needs. The forage available to the calf is assumed to be forage that has new growth in May, flowers in late June to early July, sets seed in late July to mid-August and becomes fully mature and weathered from September onward.

Initially the calf is only able to consume about 1% of its body weight in forage dry matter. With increasing age, the calf can consume up to 2% body weight in forage. The consumption level drops to 1.5% body weight as forage maturity increases and digestibility decreases in the fall.

Nutrients from the lactating dam peak with about 25 lbs. per day milk production in May and level off with about 10 pound per day milk production from mid-July until weaning.

The points to note are listed below the appropriate tables.

Table 11

CATTLE REQUIREMENTS & AVAILABILITY

NURSING CALF @ 2.25 Lbs/Day

ENERGY (TDN)

Month	Animal Weight Pounds	Forage Consumed Pounds	Energy (TDN) Requirements (Lbs)	Energy (TDN) Available From		
				Milk	Forage	Total
MAY	180	*(1%) 2	4.3	3.1	1.4 =	4.5
JUNE	250	*(1.5%)4	5.4	3.1	2.6 =	5.7
JULY	320	*(2%) 6	6.6	3.1	3.6 =	6.7
AUG.	380	*(2%) 8	7.5	1.5	4.0 =	5.5
SEPT.	450	*(2%) 9	8.5	1.5	4.5 =	6.0
OCT.	520	*(1.5%)8	9.6	1.25	3.6 =	4.9

* Percentage of body weight = Pounds Consumed.

Points to Note;

1. Energy shortage is 2 lbs. TDN in August and increases to a 4.7 lb. TDN shortage in October.
2. By August, milk is supplying only 20% of the energy requirements. This drops to only 13% by October.
3. An additional 2 lbs. TDN per day will provide an extra pound per day gain.

Table 12

CATTLE REQUIREMENTS & AVAILABILITY

NURSING CALF @ 2.25 Lbs/Day

CRUDE PROTEIN (Lbs)

Month	Animal Weight Pounds	Forage Consumed Pounds	Crude Protein Requirements (Lbs)	Crude Protein (Lbs) Available From		
				Milk	Forage	Total
MAY	180	*(1%) 2	.96	.62	.36	= .98
JUNE	250	*(1.5%)4	1.11	.62	.56	=1.18
JULY	320	*(2%) 6	1.21	.62	.60	=1.22
AUG.	380	*(2%) 8	1.29	.31	.72	=1.03
SEPT.	450	*(2%) 9	1.38	.31	.63	= .94
OCT.	520	*(1.5%)8	1.50	.25	.56	= .81

* Percentage of body weight = Pounds Consumed.

Points to Note:

1. Protein is adequate until August at which point there is a shortage of ¼ lb. per day.
2. Protein availability continues to decline and by October there is a 3/4 lb. per day shortfall.
3. One pound of protein (the amount available in August) will enable the calf to gain only 1.5 lbs. rather than the expected 2.25 lbs/day.

Table 13

CATTLE REQUIREMENTS & AVAILABILITY

NURSING CALF @ 2.25 Lbs/Day

PHOSPHORUS (Lbs)

Month	Animal Weight Pounds	Forage Consumed Pounds	Phosphorus Requirements (Lbs)	Phosphorus (Lbs) Available From Milk	Forage	Total
MAY	180	*(1%) 2	.040	.02	.008	= .028
JUNE	250	*(1.5%)4	.041	.02	.012	= .032
JULY	320	*(2%) 6	.042	.02	.009	= .029
AUG.	390	*(2%) 8	.042	.01	.008	= .018
SEPT.	450	*(2%) 9	.043	.01	.009	= .019
OCT.	520	*(1.5%)8	.044	.007	.007	= .014

* Percentage of body weight = Pounds Consumed.

Points to Note:

1. Major phosphorus shortages occur in August, September and October.
2. The degree of shortfall in these months (less than half the requirements) is severe. Phosphorus levels below .02 lbs/day will not support maximum daily gains.

Effects of Nutritional Shortages on Calf Weight Gains

Table 14 outlines the effects of the mid-July through October nutrient shortages on live weight gains.

It is interesting that both energy and protein are defficient in the diet and to about the same degree.

The nutritional shortages outlined result in about a 450 pound calf by August 15 (210 days of age). Genetic potential for even the lower gaining animals is adequate to achieve 550 lbs. at 210 days of age if nutrition is adequate from July 15 onward.

This represents a loss in potential of 100 pounds per calf. The gap widens to 160 lbs. per calf if weaning is delayed another month until November 15.

This reduction in weaning weights can easily exceed $100 per calf or $10,000 for a 120 cow herd.

Table 14

EFFECTS OF NUTRITIONAL SHORTAGES
ON
CALF WEIGHT GAINS

	Gain (lbs/day)		Calf Weight (lbs)	
Date	Deficient	Potential	Deficient	Potential
March 15			75	75
Daily Gain	1.75	1.75		
April 15			128	128
Daily Gain	2.00	2.00		
May 15			198	198
Daily Gain	2.50	2.50		
June 15			273	273
Daily Gain	2.50	2.50		
July 15			348	348
Daily Gain	1.50	2.25		
August 15			393	416
Daily Gain	1.00	2.25		
September 15			423	484
Daily Gain	.75	2.25		
October 15			446	552
Daily Gain	.50	2.25		
November 15			461	620

Nutrient Requirements and Availability - Yearling Steers

Tables 15, 16 and 17 show the requirements and availability of energy, protein and phosphorus for yearling steers expected to gain 2 lbs. per day during the summer months.

It is interesting to note that energy and protein are about equally limiting as the season progresses.

The points to note are listed below the appropriate tables.

Table 15

CATTLE REQUIREMENTS & AVAILABILITY

YEARLING STEERS @ 2 Lbs/Day

ENERGY (TDN)

Month	Animal Weight Pounds	Forage Consumed Pounds	Energy Requirements (Lbs)	Energy (TDN) Available From Forage
MAY	600	*(2.5%) 15	10.1	10.5
JUNE	660	*(2.5%) 16.5	10.8	10.7
JULY	720	*(2.0%) 14.5	11.5	8.7
AUG.	780	*(2.0%) 15.5	12.4	7.75
SEPT.	840	*(1.75%)15	13.1	7.50
OCT.	900	*(1.50%)13.5	13.9	6.08

* Percentage of body weight = Pounds Consumed.

Points to Note:

1. Energy becomes limiting in July. The 3 lb. TDN shortage will reduce average daily gains on a 720 pound animal by about 1 lb. per day.

2. By October, there is only sufficient energy available to maintain a 750 lb. yearling steer (no weight gain).

Table 16

CATTLE REQUIREMENTS & AVAILABILITY

YEARLING STEERS @ 2 Lbs/Day

CRUDE PROTEIN (Lbs)

Month	Animal Weight Pounds	Forage Consumed Pounds	Crude Protein Requirements (Lbs)	Crude Protein (Lbs) Available From Forage
MAY	600	*(2.5%) 15	1.65	2.7
JUNE	660	*(2.5%) 16.5	1.70	2.31
JULY	720	*(2.0%) 14.5	1.75	1.45
AUG.	780	*(2.0%) 15.5	1.85	1.40
SEPT.	840	*(1.75%)15	1.90	1.05
OCT.	900	*(1.50%)13.5	1.95	.95

* Percentage of body weight = Pounds Consumed.

Points to Note:

1. Protein becomes deficient in July. A shortfall of about 1/4 lb. protein will reduce average daily gains by about 1 lb. per day.

2. By September, available protein is so low that no gain is possible. It is obvious that the animal selects higher protein-containing plants (fresh green growth, browse, etc.). This selectivity enables some weight gain to occur but it is far below the potential of 2 lbs. per day.

Table 17

CATTLE REQUIREMENTS & AVAILABILITY

YEARLING STEERS @ 2 Lbs/Day

PHOSPHORUS (Lbs)

Month	Animal Weight Pounds	Forage Consumed Pounds	Phosphorus Requirements (Lbs)	Phosphorus (Lbs) Available From Forage
MAY	600	*(2.5%) 15	.042	.060
JUNE	660	*(2.5%) 16.5	.042	.049
JULY	720	*(2.0%) 14.5	.041	.022
AUG.	780	*(2.0%) 15.5	.040	.016
SEPT.	840	*(1.75%)15	.040	.015
OCT.	900	*(1.50%)13.5	.040	.011

* Percentage of body weight = Pounds Consumed.

Points to Note:

1. Phosphorus becomes severely limiting in August. Body stores can be drawn on to some extent. However, these stores will eventually become restrictive.
2. By October, only 1/4 of the phosphorus requirements are being met.
3. Adequate phosphorus in the diet helps to maintain appetite!

Effects of Nutritional Shortages on Yearling Steer Weight Gains

Table 18 outlines the effects of the mid-July through October nutrient shortages on live weight gains of yearling steers.

Both energy and protein limit weight gains during the late summer and fall period. Each nutrient is deficient to about the same degree in terms of the effects on live weight gains.

Most yearling steers have the genetic potential to gain at least 2 lbs. per head per day on pasture. Thus there is the genetic potential to put on at least 300 pounds from May through October. This is often not achieved due to limiting energy protein and phosphorus from mid-July onward.

The shortfall of nutrients shown in Tables 15, 16 and 17 have enabled only 188 lbs. gain in the 150 day period for an average daily gain of 1.25 lbs. per day. This represents a reduction of over 100 lbs. per animal for the 150 day feeding period. Most of the lost potential occurs in the last 75 days! The Table points out that sufficient nutrients are available to achieve over 2 lbs. per day gain in at least the first two months.

Reduced productivity in the last 75 days of the grazing season has cost over 100 lbs. per head or roughly $85 per steer (over $1.00 per day for the 75 day period).

Table 18

EFFECTS OF NUTRITIONAL SHORTAGES

ON

YEARLING STEER WEIGHT GAINS

	Gain (lbs/day)		Steer Weight (lbs)	
Date	Deficient	Potential	Deficient	Potential
May 1			600	600
Daily Gain	2.00	2.00		
June 1			660	660
Daily Gain	2.00	2.00		
July 1			720	720
Daily Gain	1.00	2.00		
August 1			750	780
Daily Gain	.75	2.00		
September 1			773	840
Daily Gain	.50	2.00		
October 1			788	900

Avoiding Nutritional Shortages to Achieve Production Potential and Increase Profitability

If 210 day weaning weights are around 450 lbs., we have seen that gross returns can be increased by $10,000 or more on a 120 cow herd.

Each operation will have a different and unique range of opportunities to take advantage of this enormous potential. Here are some suggestions:

1. Supply phosphorus supplements from July onward. Consumption should be about 1 oz/head per day. A good phosphorus mineral mix will cost about $650/tonne. A 120 cow herd will require about 900 lbs. for 4 months at a cost of about $265 for the mineral.

2. Devise a grazing program to enable cattle to use higher quality feed from July 15 onward (regraze areas which were grazed earlier in the year, use different forage species, graze areas which are later maturing, graze hay fields, use special pastures or annual crops, etc. Consult your grazing specialists.

3. Creep feed calves from July 15 till sale date.

4. Wean calves early and put them on higher quality feed (irrigated pasture, pasture and grain, confinement with a high quality ration). Calves must be weaned early enough to recover from weaning stress, become accustomed to a new ration and achieve high gains. Generally a minimum of 60 days will be required. Why not wean in July?

5. Use crossbreds or change breeds to achieve heavier milking brood cows. Advantages may not be fully realized if cow nutrition is too low for adequate milk production. Also, remember milk is only supplying 15 to 20% of the nutritional requirements from July onward. If you could achieve even a 50% increase in milk production by crossbreeding (which is unlikely), milk would supply less than 30% of the nutritional needs and a large nutritional shortage would still occur unless forage quality is improved.

6. If you are using exotic crosses now and have weaning weights above 550 lbs., you may still be achieving far less than the potential weaning weight. The examples used reflect a potential average daily gain

(birth to weaning) of 2.25 lbs. per day. Many animals are capable of achieving well over 3 lbs. per day birth to weaning.

You may consider other changes to achieve higher production potentials. Often these changes are complex and may have a number of effects on your operation. They must be considered carefully. The costs of these changes must be calculated and compared to the benefits achieved. Staff members of the Ministry of Agriculture can help you identify and evaluate these opportunities.

Managing the Total Forage Resource

Greg Tegart

What follows is an outline of the topics I discussed with you during the workshop. It is intended to act as a guide so you can answer the question, "who was it that talked about. . . . .?".

The guts of this talk and the preceding talks is OPTIONS. We are trying to stimulate you to consider whether or not changes can be made and have a positive impact on your operation. In general most options come in the form of INTENSIFICATION and/or MANIPULATION. Some of the ideas or considerations my topic incorporates are:

-- Adjusting your pasture/range rotations to make the best quality forage possible available to your animals.

-- Setting aside pastures for specific uses; e.g. spring grazing, fall grazing, breeding, for calves etc.

-- Increasing your stored forage production allowing more land with which to make adjustments. e.g. crop changes, double cropping, a cash crop, etc.

-- Graze the fields you are converting the heaviest or at the most "critical" times, i.e. the 15% - 20% you reseed each year.

-- Use annual species to provide pasture for a specific period or need. Such things as annual ryegrass, winter wheat, winter triticale, winter rye. . . . .

-- Bring your calves home early to a pasture set aside for that purpose.
  - -- be prepared to feed barley to ensure a high daily gain and to increase your pastures' carrying capacity.
    e.g. for 500 lb. animals 2½ - 3 lb. per day of barley could add one pound per day gain and increase your stocking rate by 25%. This would cost (barley at $175 per tonne) 24 cents per pound of gain.

-- Supplement your cattle, while on range e.g. creep feeding, minerals etc.

-- Consider different crops for your stored feeds, e.g. corn, barley, annual ryegrass, winter cereals, forage turnips, etc. etc.

-- Intensification of pasture management using the plant growth characteristics exemplified in the New Zealand Pasture Management discussion.

-- Cost savings of employing electric fencing technology.

-- General range or ranch developments such as:
  - new pastures
  - adjusting species
  - increasing stocking intensities
  - quick early use with the intent of regrazing
  - thinning, burning of trees

Our presentations are certainly not all encompassing, there are many considerations we have likely missed, and not all those offered will necessarily work for you. If you are at all interested in trying something different, tracking down an idea you heard elsewhere or whatever, please feel free to ask us for our assistance. Thank you.